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Ether Barbiturate Anesthesia.

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That barbiturates as well as other non-volative anesthetics (hypnotics) act additively with ethylene or nitrous oxide has been conclusively shown by several investigators[1, 2, 3, 4] as also by clinical experience. That this also holds good with ether seemed to have been shown by clinical observations. Consequently considerable surprise and doubt arose when Calderone[5] reported that in dogs he had been unable to find any evidence that there was any additive effect of barbiturates when given with ether. This communication brings a brief report of the results obtained by us in further investigations of this problem.

Methods. Dogs were used throughout. Under light ether anesthesia, carotid and tracheal cannulae were inserted and the tracheal cannula connected with a leak proof system containing soda-lime into which oxygen and ether could be introduced as needed. The ether concentration in the system was then slowly increased until various degrees of anesthesia were obtained. By frequent sampling, the ether, carbon dioxide, and oxygen concentrations were determined and either increased, diminished, or kept constant as was desired. In 5 experiments intravenous injections of 10 mg./K Nembutal (20% of M.L.D.) and in one of 20 mg./K of Dial-Ciba (20% of M.L.D.) without exception produced so unmistakable an increase in the depth of the anesthesia that no other conclusion can be drawn than that these two barbiturates act additively with ether.

Data from a typical observation follow: Dog C from 9:41 to 10:54 respired a mixture in which the ether concentration was gradually increased from 2.7 to 3.1%, corneal and toe reflexes (motor response to crushing of toe) and muscle tone not being abolished. A concentration of 3.7% of ether respired from 11:00 to 11:21 induced and maintained almost complete surgical anesthesia, muscular relaxation being complete although corneal and toe reflexes were faintly positive. When ether percentage was reduced to 2.6 at

[1] Stormont, Lampe, and Barlow, *J. Pharmacol. and Exp. Ther.*, 1930, **39**, 165.

[2] Barlow, Duncan and Gledhill, *J. Pharmacol. and Exp. Ther.*, 1931, **41**, 367.

[3] Kleindorfer and Halsey, *J. Pharmacol. and Exp. Ther.*, 1931, **43**, 449.

[4] Swanson, E. E., *J. Pharmacol. and Exp. Ther.*, 1932, **46**, 389.

[5] Calderone, Read at Anesthetic Congress, N. Y., Oct., 1932.

12:03, both reflexes were active and muscular relaxation was incomplete. By 12:46 with ether percentage at 2.1, corneal and toe reflexes were very active and there was little or no muscular relaxation. Intravenous injection 12:48 to 1:03 of 20 mg./K of Dial-Ciba was followed within two minutes by a state of profound anesthesia with complete muscular relaxation, disappearance of the corneal reflex and almost complete abolition of motor response to violent crushing of the toe. This condition remained unchanged for 1 hour, the ether being kept at 2.0 to 2.1%. At 2:25, with ether reduced to 1.6%, muscle relaxation became incomplete and corneal and toe reflexes became active again. With the shorter acting Nembutal, similar results were obtained except that after 15 to 30 minutes, the anesthesia became progressively less intense. Numerous observations on the effects of Dial-Ciba and Nembutal in the dosage used in these experiments have shown that by themselves they do not appreciably affect muscular relaxation or the activity of the corneal or toe reflexes.

The effect of morphine on ether anesthesia will be reported at a later date.

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Observations on Coronary Occlusion.*

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(Introduced by Raymond Hussey.)

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A series of experiments were made to correlate the anatomic, electrocardiographic and myocardial surface temperature changes following ligation of the anterior descending branch of the left coronary artery. The effect of stellate ganglionectomy on these changes was also studied. Seventeen dogs were used.

Under amytal anesthesia, with respirations maintained by positive pressure the pericardium was exposed by cutting a window through the anterior portion of the left 5th and 6th ribs. The pericardium was opened and sutured to the adjacent pleura. The stellate ganglion was exposed by an anterior axillary approach. The anterior descending branch of the left coronary artery was ligated 1

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